

Claims

[c1] What is claimed is:

1.A method for fabricating a bottle-shaped deep trench comprising:

providing a substrate having a pad layer thereon;

etching the pad layer and the substrate to form a deep trench, the deep trench having a sidewall and a bottom surface;

performing an atomic layer deposition (ALD) process to form a nonmetal layer on the pad layer and on an upper portion of the sidewall of the deep trench; and

performing an isotropic etching process by taking the nonmetal layer as a hard mask to remove a portion of the sidewall and the bottom surface of the deep trench not covered by the nonmetal layer so as to form a bottle-shaped deep trench.

[c2] 2.The method of claim 1, wherein the ALD process is performed in a low-pressure chemical vapor deposition (LPCVD) chamber.

[c3] 3.The method of claim 1, wherein the nonmetal layer is formed with a plurality of ALD processes.

- [c4] 4.The method of claim 1, wherein the nonmetal layer is an ALD nitride layer or an ALD oxide layer.
- [c5] 5.The method of claim 1, wherein the isotropic etching process is a wet-etching process.
- [c6] 6.The method of claim 5, wherein a wet-etching agent of the wet etching process is ammonia water (NH_4OH).